



US010620871B1

(12) **United States Patent**
Mukku et al.

(10) **Patent No.:** **US 10,620,871 B1**
(45) **Date of Patent:** **Apr. 14, 2020**

(54) **STORAGE SCHEME FOR A DISTRIBUTED STORAGE SYSTEM**

(71) Applicant: **Robin Systems, Inc.**, San Jose, CA (US)

(72) Inventors: **Jagadish Kumar Mukku**, San Jose, CA (US); **Kallur Vasudeva Rao Narasimha Subban**, Cupertino, CA (US)

(73) Assignee: **ROBIN SYSTEMS, INC.**, San Jose, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/192,471**

(22) Filed: **Nov. 15, 2018**

(51) **Int. Cl.**
G06F 3/06 (2006.01)
H04L 29/08 (2006.01)
G06F 16/185 (2019.01)

(52) **U.S. Cl.**
CPC **G06F 3/065** (2013.01); **G06F 3/0604** (2013.01); **G06F 3/067** (2013.01); **G06F 3/0644** (2013.01); **G06F 3/0662** (2013.01); **G06F 16/185** (2019.01); **H04L 67/1097** (2013.01)

(58) **Field of Classification Search**
CPC **G06F 3/065**; **G06F 3/0604**; **G06F 3/0644**; **G06F 3/0662**; **G06F 3/067**; **G06F 12/00**; **G06F 13/00**
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,310,883 A 1/1982 Clifton
5,602,993 A 2/1997 Stromberg
6,014,669 A 1/2000 Slaughter

6,119,214 A 9/2000 Dirks
6,157,963 A 12/2000 Courtright, II
6,161,191 A 12/2000 Slaughter
6,298,478 B1 10/2001 Nally
6,301,707 B1 10/2001 Carroll
6,311,193 B1 10/2001 Sekido
6,851,034 B2 2/2005 Challenger
6,886,160 B1 4/2005 Lee
6,895,485 B1 5/2005 Dekoning
6,957,221 B1 10/2005 Hart

(Continued)

FOREIGN PATENT DOCUMENTS

WO WO2017008675 1/2017

OTHER PUBLICATIONS

Segment map.

(Continued)

Primary Examiner — Tuan V Thai

(74) Attorney, Agent, or Firm — David R. Stevens;
Stevens Law Group

(57) **ABSTRACT**

An application executing on a first computing platform includes containers executing role instances. One or more logical storage volumes include segments allocated to the application and references in a mapping table. The mapping table indicates a tier ID corresponding to the computing platform on which each segment is located. A snapshot of the application may be restored on a second computing platform. The mapping table may be copied to the second computing platform and used without transferring segments from the first computing platform to the second computing platform. Reads will be routed to the first computing platform using the tier ID in the mapping table.

20 Claims, 20 Drawing Sheets

